

**CLAIMS**

1. A multi-frame tape library system, comprising:

a plurality of individual frames connected in series, each said frame comprising a pulse signal generator and a delay signal generator, at least one said frame also comprising a total count counter;

a multi-channel bus coupled to each said frame and comprising a frame bus for carrying information indicative of the presence of each said frame, and a power bus return bus carrying information indicative of the last frame in said series;

wherein one of said frames being defined as a first frame and adapted to receive a signal indicative of power being supplied to any one of said frames and generate a delayed signal, each subsequent frame receiving said delayed signal and generating a further delayed signal and each frame generating a pulse on said frame bus; wherein one of said frames being defined as said last frame and receiving said delayed signal and generating a signal to activate said power return bus; and wherein said total count counter being incremented by each said pulse on said frame bus until said power return bus is activated.

2. A multi-frame tape library system as claimed in claim 1, wherein the count in said total count counter represents the total number of said frames connected together.

3. A multi-frame tape library system as claimed in claim 1, wherein at least one said frame generating a frame pulse when said delay signal is generated for that frame.

4. A multi-frame tape library system as claimed in claim 3, wherein at least one said frame further comprising an individual ID counter being incremented by each said pulse on said frame bus until said frame pulse is generated.

1 5. A multi-frame tape library system as claimed in claim 4, wherein the count in said  
2 individual ID counter represents the individual ID of the frame with respect to the total number  
3 of said frames connected together.

1 6. A multi-frame tape library system as claimed in claim 1, wherein said delayed signal  
2 generated by each said frame having a predetermined delay value that is approximately constant.

1 7. A multi-frame tape library system as claimed in claim 1, wherein said delayed signal  
2 generated by each said frame having a delay value that is variable.

1 8. A modular tape library system comprising:

2 a plurality of individual frames connected together in series, at least one frame  
3 comprising a total count counter;

4 a multi-channel bus for exchanging information and data between said frames indicative  
5 of the presence of each said frame and information indicative of the last frame in said series;

6 wherein at least of said frames being adapted to receive a signal indicative of power  
7 being supplied to any one of said frames and generate a pulse indicative of its presence and a  
8 delayed signal which is forwarded to the next frame in the series, each subsequent frame  
9 receiving said delayed signal and generating a further delayed signal and a pulse indicative of  
10 their presence; and wherein one of said frames being defined as said last frame and receiving  
11 said delayed signal and generating a signal to indicate activation of said last frame; and wherein  
12 said total count counter being incremented by each said pulse until signal to indicate activation  
13 of said last frame is detected.

1 9. A modular system as claimed in claim 8, wherein the count in said total count counter  
2 register represents the total number of said frames connected together.

1 10. A modular system as claimed in claim 8, wherein at least one said frame generating a  
2 frame pulse when said delay signal is generated for that frame.

1 11. A modular system as claimed in claim 10, wherein at least one said frame further  
2 comprising an individual ID counter being incremented by each said pulse until said frame pulse  
3 is generated.

1 12. A modular system as claimed in claim 11, wherein the count in said individual ID counter  
2 represents the individual ID of the frame with respect to the total number of said frames  
3 connected together.

1 13. A method to automatically detect the total count of frames within a modular multi-frame  
2 tape library system, said method comprising the steps of:

3 coupling a plurality of frames to a multi-channel data bus comprising a frame bus and a  
4 power bus return bus;

5 designating one of said frames as a first frame;

6 designating one of said frames as a last frame;

7 said first frame receiving a signal indicative of power being supplied to any one of said  
8 frames and generating a first delayed signal and a pulse indicative of the presence of said first  
9 frame;

10 supplying said pulse to said frame bus;

11 supplying said delayed signal to a subsequent frame, each said subsequent frame  
12 generating a delayed signal and a pulse indicative of the presence of each frame and supplying  
13 the pulses to said frame bus;

14 generating a signal to activate said power return bus when said delayed signal reaches  
15 said last frame; and

16 incrementing a register by each pulse until said power bus is activated.

1 14. A method as claimed in claim 13, further comprising the steps of:

2 generating a frame pulse when said delay signal is generated for that frame;

3 incrementing a register by each said pulse on said frame bus until said frame pulse is  
4 generated.

1 15. A method as claimed in claim 14, wherein the count in said counter represents the  
2 individual ID of the frame with respect to the total number of said frames connected together.

1 16. A method as claimed in claim 13, wherein the count in said register represents the total  
2 number of said frames connected together.

1 17. A multi-frame tape library system, comprising:

2 a plurality of individual frames connected in series, each said frame comprising a pulse  
3 signal generator and a delay signal generator, at least one said frame also comprising an  
4 individual ID counter;

5 a multi-channel bus coupled to each said frame and comprising a frame bus for carrying  
6 information indicative of the presence of each said frame;

7 wherein one of said frames being defined as a first frame and adapted to receive a signal  
8 indicative of power being supplied to any one of said frames and generate a delayed signal, each  
9 subsequent frame receiving said delayed signal and generating a further delayed signal and each  
10 frame generating a pulse on said frame bus; wherein at least one of said frames generating a  
11 frame pulse upon generation of that frame's delayed signal, and wherein said individual ID  
12 counter being incremented by each said pulse on said frame bus until said frame pulse is  
13 detected.

1 18. A multi-frame tape library system as claimed in claim 17, wherein the count in said  
2 individual ID counter represents the individual ID of the frame with respect to the total number  
3 of said frames connected together.

1 19. A multi-frame tape library system as claimed in claim 17, wherein said multi-channel bus  
2 further comprising a power bus return bus carrying information indicative of the last frame in  
3 said series; and wherein one of said frames being defined as said last frame and receiving said  
4 delayed signal and generating a signal to activate said power return bus.

1 20. A multi-frame tape library system as claimed in claim 19, wherein at least one said frame  
2 further comprising a total count counter; and wherein said total count counter being incremented  
3 by each said pulse on said frame bus until said power return bus is activated.

1 21. A multi-frame tape library system as claimed in claim 20, wherein the count in said total  
2 count counter represents the total number of said frames connected together.

1 22. A modular tape library system comprising:

2 a plurality of individual frames connected together in series, at least one frame  
3 comprising an individual ID counter;

4 a multi-channel bus for exchanging information and data between said frames indicative  
5 of the presence of each said frame;

6 wherein at least of said frames being adapted to receive a signal indicative of power  
7 being supplied to any one of said frames and generate a pulse indicative of its presence and a  
8 delayed signal which is forwarded to the next frame in the series, each subsequent frame  
9 receiving said delayed signal and generating a further delayed signal and a pulse indicative of  
10 their presence; wherein at least one of said frames generating a frame pulse upon generation of

11 that frame's delayed signal, and wherein said individual ID counter being incremented by each  
12 said pulse on said frame bus until said frame pulse is detected.

1 23. A modular system as claimed in claim 22, wherein the count in said individual ID counter  
2 represents the individual ID of the frame with respect to the total number of said frames  
3 connected together.

1 24. A modular system as claimed in claim 22, wherein said multi-channel bus further  
2 comprising a power bus return bus carrying information indicative of the last frame in said  
3 series; and wherein one of said frames being defined as said last frame and receiving said  
4 delayed signal and generating a signal to activate said power return bus.

1 25. A modular system as claimed in claim 24, wherein at least one said frame further  
2 comprising a total count counter; and wherein said total count counter being incremented by each  
3 said pulse on said frame bus until said power return bus is activated.

1 26. A modular system as claimed in claim 25, wherein the count in said total count counter  
2 represents the total number of said frames connected together.

1 27. A method to automatically detect the individual identification of frames within a modular  
2 multi-frame tape library system, said method comprising the steps of:

3 coupling a plurality of frames to a multi-channel data bus comprising a frame bus;

4 designating one of said frames as a first frame;

5 said first frame receiving a signal indicative of power being supplied to any one of said  
6 frames and generating a first delayed signal and a pulse indicative of the presence of said first  
7 frame;

8 supplying said pulse indicative of the presence of said first frame to said frame bus;

supplying said delayed signal to a subsequent frame, each said subsequent frame  
generating a delayed signal and a pulse indicative of the presence of each frame and supplying  
the pulses to said frame bus;  
generating a signal upon generation of said delayed signal; and  
incrementing a register by each pulse until said signal is generated.

28. A method as claimed in claim 27, further comprising the steps of:

coupling said plurality of frames to said multi-channel bus further comprising a power  
bus return bus;

designating one of said frames as a last frame;

generating a signal to activate said power return bus when said delayed signal reaches  
said last frame; and

incrementing a register by each said pulse until activation of said power return bus.

29. A method as claimed in claim 27, wherein the count in said counter represents the  
individual ID of the frame with respect to the total number of said frames connected together.

30. A method as claimed in claim 28, wherein the count in said counter represents the total  
number of said frames connected together.

31. A multi-frame tape library system, comprising:

a plurality of individual frames connected in series, each said frame comprising a pulse  
signal generator and a delay signal generator, at least one said frame also comprising a total  
count counter and an individual ID counter;

a multi-channel bus coupled to each said frame and comprising a frame bus for carrying  
information indicative of the presence of each said frame, and a power bus return bus carrying  
information indicative of the last frame in said series;

8 wherein one of said frames being defined as a first frame and adapted to receive a signal  
9 indicative of power being supplied to any one of said frames and generate a delayed signal, each  
10 subsequent frame receiving said delayed signal and generating a further delayed signal and each  
11 frame generating a pulse on said frame bus; wherein one of said frames being defined as said last  
12 frame and receiving said delayed signal and generating a signal to activate said power return bus;  
13 and wherein said total count counter being incremented by each said pulse on said frame bus  
14 until said power return bus is activated; and wherein at least one said frame generating a frame  
15 pulse when said delay signal is generated for that frame, said individual ID counter being  
16 incremented by each said pulse on said frame bus until said frame pulse is generated.

1 32. A multi-frame tape library system as claimed in claim 31, wherein the count in said  
2 individual ID counter represents the individual ID of the frame with respect to the total number  
3 of said frames connected together.

1 33. A multi-frame tape library system as claimed in claim 31, wherein the count in said total  
2 count counter represents the total number of said frames connected together.

1 34. A method to automatically detect the total count and individual identification of frames  
2 within a modular multi-frame tape library system, said method comprising the steps of:

3 coupling a plurality of frames to a multi-channel data bus comprising a frame bus and a  
4 power bus return bus;

5 designating one of said frames as a first frame;

6 designating one of said frames as a last frame;

7 said first frame receiving a signal indicative of power being supplied to any one of said  
8 frames and generating a first delayed signal and a pulse indicative of the presence of said first  
9 frame;



10 supplying said pulse to said frame bus;  
11 supplying said delayed signal to a subsequent frame, each said subsequent frame  
12 generating a delayed signal and a pulse indicative of the presence of each frame and supplying  
13 the pulses to said frame bus;  
14 generating a signal to activate said power return bus when said delayed signal reaches  
15 said last frame;  
16 incrementing a first counter by each pulse until said power bus is activated;  
17 generating a frame pulse when said delay signal is generated for that frame;  
18 incrementing a second counter by each said pulse on said frame bus until said frame  
19 pulse is generated.

1 35. A method as claimed in claim 34, wherein the count in said second counter represents the  
2 individual ID of the frame with respect to the total number of said frames connected together.

1 36. A method as claimed in claim 34, wherein the count in said first counter represents the  
2 total number of said frames connected together.